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Impact of Renal Function on Changes of Plaque Characteristics in Statin-Treated Patients

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Background: It is not well known about the relation between renal function and plaque changes in patients with angina pectoris and hypertension who uses statins. The aim of this study was to evaluate the impact of renal dysfunction on changes of plaque characteristics in statin-treated patients with angina pectoris and hypertension using virtual histology-intravascular ultrasound (VH-IVUS).

Methods: We assessed plaque changes between patients with CKD (n=81, estimated creatinine clearance (CrCl) < 60 mL/min) and those without CKD (n=117) who underwent baseline and follow-up VH-IVUS for non-intervened intermediate coronary artery stenosis.

Results: %necrotic core (NC) area at minimum lumen area (MLA) site (22.5±11.7% vs. 19.0±11.1%, p=0.035) and %NC volume (20.3±8.0% vs. 15.8±9.4%, p=0.001) were significantly greater, and thin-cap fibroatheroma was observed more frequently (25.9% vs. 10.3%, p=0.004) in CKD group compared with non-CKD group. Follow-up VH-IVUS was performed in about 9 months after baseline VH-IVUS examinations. At follow-up, plaque progressed in CKD group, in contrast plaque regressed in non-CKD group [Δplaque plus media (P&M) area at MLA site: +0.41±0.72 mm² vs. -0.78±0.64 mm², p<0.001]. The CrCl correlated with ΔP&M area at MLA site (r=-0.538, p<0.001) and Δ%NC area at MLA site (r=-0.167, p=0.019). CrCl (OR 0.901, 95% CI 0.867-0.936, p<0.001) and baseline %NC area at MLA site (OR 1.251, 95% CI 1.116-1.403, p<0.001) were the independent predictors of plaque progression at follow-up.

Conclusions: In patients with angina pectoris and hypertension who uses statins, renal dysfunction is associated with plaque progression and increase of NC component at follow-up.

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Association between epicardial fat volume with coronary artery plaque characterization

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Background: EAT shares a common embryological origin with intra-abdominal visceral fat depots and obtains its vascular supply from the coronary arteries. EAT volume was larger in the presence of obstructive CAD and non-calcified plaques. A high EAT volume was associated with the presence of vulnerable plaque components, independent of obesity measurements (BMI and VAT) and CAC scores.

Methods: Data were reviewed for 249 consecutive patients with de novo coronary artery lesions who underwent elective per-cutaneous coronary intervention (PCI) at our institution during the period from September 2011 to June 2012. We selected the most stenotic lesion per subject, and IVUS was performed for vessels with [50 % diameter stenosis on quantitative coronary angiography (QCA). A total of 119 patients were excluded because of in-stent restenosis (n = 38), a history of coronary artery bypass graft surgery (n = 1), chronic total occlusion (n = 15), severe calcification that the IVUS catheter could not cross (n = 36), or no multislice computed tomography (CT) within 3 months (n = 29) (Fig. 1). As a result, the present study assessed 130 consecutive patients with stenosis who underwent de novo coronary intervention.

Results: EATV was 66.8±26.5 (range, 20.8 to 164.4ml). A positive correlation was found between EATV and the percentage of necrotic tissue (r=0.42, p=0.018). However, significant correlation was not observed between EATV and the percentage of fibrotic tissue (r=0.24, p=0.231), lipidic tissue (r=0.32, p=0.137), or calcified tissue (r=0.04, p=0.670). Additionally, multivariate analysis by linear regression (adjustment for age, BMI, LDL cholesterol level) revealed that increased EFV remained as an independent parameter associated with the percentage of necrotic plaque (r=0.37, p=0.024).

Conclusions: Our data demonstrated that increased EATV was associated with the development of coronary atherosclerosis and potentially the most dangerous types of plaques. The measurement of EFV may be a useful marker for detecting the plaque vulnerability.

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Reproducibility Of The Carpet View System: A Novel Technical Solution For Display And Off Line Analysis Of OCT Images

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Background: The Optical Coherence Tomography (OCT) evaluation of the stent anatomy requires the inspection of sequential cross section (CS). However stent coils cannot be appreciated in the conventional format as the OCT CS simply display stent struts, that are poorly representative of the stent architecture. The aim of the present study was to validate a new software (Carpet View), which unfolds the stented segment, reconstructing it as an open structure and displaying the stent meshwork.

Methods: 21 patients were studied with frequency domain OCT after the deployment of different stents: 7 bio-absorbable scaffolds (Dream), 7 Bare metal stent (Vision/Multilink8), 7 drug eluting stent (Cre8). Conventional CS reconstructions were post-processed with the Carpet View software and analyzed by the same reader twice (intra-observer variability) and by two different readers (inter-observer variability).

Results: A small average difference in the number of all struts was obtained with the two methods (Conventional vs Carpet view reconstruction). Using the Carpet view, high intra-observer and inter-observer correlations were found for the number of struts obtained in each coil. The Pearson correlation values were 0.98 (p=0.0001) and 0.96 (p=0.0001) respectively. The same number of coils was found when analyses were repeated by the same reader or by a different reader whilst mild differences in the count of stent junctions were reported.

Conclusions: The Carpet View can be used to address the stent geometry with high reproducibility. This approach enables the matching of the same stent portion during serial time points and promises to improve the stent assessment.

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Atherosclerotic Plaque Formation Relates to Myocardial Bridging in Left Anterior Descending Coronary Arteries

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Background: Prior studies indicated that myocardial bridging (MB) can alter the distribution of atherosclerosis within the LAD, possibly contributing to adverse events in a certain patient subset. However, evidence remains limited due to the lack of control in the majority of studies. This study aimed to evaluate the atherosclerotic plaque morphology with direct comparison of MB and non-MB patients.

Methods: We evaluated 132 patients with angiographically non-obstructed coronary arteries. MB was defined by IVUS as an echolucent muscle band partially surrounding the LAD. In MB patients, LAD was divided into 3 segments: proximal (LAD ostium to MB entrance), MB, and distal (20 mm from MB exit). In non-MB patients, corresponding 3 segments were defined based on the average length of the above segments (proximal: 33 mm, MB: 20 mm, distal: 20 mm).

Results: IVUS identified MB in 59.1% with similar clinical characteristics between MB vs non-MB patients. At proximal segment, maximum plaque burden was significantly greater in MB patients, whereas the MB segment was notably spared compared with the corresponding segment in non-MB patients. On the other hand, differences in plaque characteristics were seen only in the MB segment (table). No effect was detected in the distal segment downstream from the MB.

Conclusions: Direct comparison of MB patients with control subjects confirmed the pathophysiologic effects of MB on plaque formation proximal to the MB. The different plaque characteristics under the MB may reflect the presence of contractile-type smooth muscle cells, accounting for suppressed atherosclerosis in this segment.

